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## Dental Facility Issues

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### Radiation Caution Signs (6/09)

**Question:** Our clinic is installing new intraoral x-ray tubeheads in all of our dental operatories. Do we need radiation cautionary signs in all of these rooms? Are there specific wording and color requirements for the signs?

**Answer:** With the deployment of digital dental radiography in all Air Force clinics, many facilities are decentralizing radiology by installing intraoral tubeheads in dental operatories. Before these recent installations, many clinics used a central radiology room for the majority of their x-ray exposures. Often the central radiology room is lead-lined and has a specific lead-lined barrier or booth that the x-ray technician stands behind while exposing radiographs. Usually, the technician closes the door while exposing radiographs and at a minimum, a sign such as, *"Please knock before entering, X-ray Room"*, is posted on the door or near the entrance to the room. Some clinics may even have the official standard radiation symbol posted to caution staff and patients. Another sign that has commonly been posted in dental waiting rooms and/or centralized radiology rooms is a sign requesting women to notify the dental staff if they may be pregnant.

#### Radiation Symbol



Specific definitions and policies governing the posting of cautionary signs in regard to radiation are published in Nuclear Regulatory Commission Regulations, Title 10 Code of Federal Regulations (10 CFR) Part 20: *Standards of protection against radiation*, and are also specifically addressed by the Air Force in AFI 48-148 *Ionizing Radiation Protection*. The following definition of **"Radiation Area"** is found in 10 CFR 20.1003:

**"Radiation area"** means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates."

The actual signage posting requirement is outlined in 10 CFR 20.1902:

**"Posting of radiation areas.** The licensee shall post each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA."

It is very unlikely that enough exposures could be taken to ever reach the dose equivalent levels in one hour in any dental radiology treatment room. Thus, our dental operatories and central radiology rooms do not meet the criteria to be defined as a **"Radiation Area"**. For this reason, posting radiation caution signs within dental facilities, especially with the official radiation hazard symbol, is not required. Most medical x-ray facilities and rooms are also exempt from this policy.

The following describes several scenarios and recommendations for caution signs.

#### Central Radiology Area

If exposures are made by a dental technician occupying the same room as the patient (e.g., central radiology), with a closed door or in a room where the technician can not control entrance by other staff members or patients into the room during an x-ray exposure, it is prudent to post a, *"Please knock before entering, X-ray Room"* sign or equivalent at the entrance to the room. A sign bearing the official radiation symbol is not required.

#### Dental Operatories with X-Ray Units

As long as standard radiation surveys have been conducted to verify the safe use of the x-ray tube head within the dental operator, cautionary signs are not required at the entrance to the operator. In this instance, the dental technician/dentist leaves the room before the exposure and can monitor patient/staff traffic in the area during the x-ray exposure.

### Using a Handheld X-Ray Unit

When using a handheld x-ray unit like the NOMAD™ or NOMAD Pro™ in a dental operatory, the dental team member (dentist or technician) not using the unit can be posted at the door to ensure that there are no unintended entrances to the room during the x-ray exposure.

### Radiation Cautionary Signs and Pregnancy

AFI 48-148 (*Ionizing Radiation Protection*), Section 4.5 addresses "X-ray Examination of Women" with sections 4.5.1 and 4.5.3, applying to dental x-ray examinations. Section 4.5.1 clearly states that all female patients shall be asked if they are pregnant before any radiology procedure. This should be standard procedure for our dental providers since they review the medical history with each patient before any examination or treatment. Dental radiology technicians in a central radiology room should always ask female patients if they are pregnant before taking dental x-rays. Section 4.5.3, specifically excludes dental waiting or examination rooms from the requirement to post signs reminding the patient to notify the staff if they may be pregnant.

These guidelines do not preclude Air Force dental clinics from posting cautionary radiation signs which exceed the recommendations stated above. Additionally, it is not recommended that clinics remove signs which have already been posted or have been based on local policy decisions.

### References:

- Air Force Instruction 48-148, Ionizing Radiation Protection (2001 edition). Available at [www.e-publishing.af.mil/](http://www.e-publishing.af.mil/). Accessed June 2009.

- Nuclear Regulatory Commission Regulations, Title 10 Code of Federal Regulations (10 CFR) Part 20: Standards of protection against radiation (2007 edition). Available at [www.nrc.gov/reading-rm/doc-collections/cfr/](http://www.nrc.gov/reading-rm/doc-collections/cfr/). Accessed June 2009.

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## Attachment 25: Format of Statements for Equipment Acquisition. Part 1-Biomedical Equipment Maintenance Section (12/07)

Completion of this document by Air Force dental clinics was requested during the initial planning stages for the DDRS. This attachment is from [AFI 41-209 Medical Logistics Support](#). Examples of areas that completion of this document steered clinics to address are computer networking, electrical power/wiring and facility modification requirements. Although all clinics should have completed this document, Force3 is discovering during their initial Pre-Deployment site surveys that dental and medical logistics personnel seem unfamiliar with the document. Most likely, this has occurred due to personnel turnover since the attachment was initially completed. Force 3 requests that Air Force clinics attempt to find the previously completed attachment and review it for accuracy. If the attachment can not be found, it is recommended that clinics re-complete Attachment 25 and have it on hand for the Pre-Deployment site survey. The [Dental Digital Primer \(April 07\)](#) provides some guidance for completion of this task.

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## Facility Modifications for X-Ray Equipment (12/07)

The installation of new intraoral tubeheads or new panoramic units may require reinforcement of existing walls for adequate support and may require dedicated electrical circuits. The central DDRS funding does not include local facility modifications. Clinics must plan and locally fund these requirements in advance of equipment placement and DDRS deployment. Many clinics are installing Planmeca Intra units (intraoral tubeheads) and ProMax digital panoramic units. Planmeca provides a "[site survey package](#)" which will enhance each clinic's ability to prepare for pre-installation requirements. The survey includes pre-installation and work agreements, checklists and most importantly facility modification requirements with diagrams. The most important of these modifications are usually wall "backing" to provide support for the equipment and the electrical power/wiring considerations. Planmeca's Government Sales Coordinator, Michelle Bottino, is available to answer specific installation preparation questions. The contact information is [michelle.bottino@planmecausa.com](mailto:michelle.bottino@planmecausa.com) or (603) 529-2300, ext. 3015.

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### From AFI 48-148 (*Ionizing Radiation Protection*):

- 4.5.1. Before any diagnostic radiology or nuclear medicine procedure, the patient shall be asked if they are pregnant.
- 4.5.3. Radiographic and nuclear medicine waiting and/or examination rooms, **other than those used exclusively for dentistry**, shall be posted with appropriate signs alerting patients that if they may be pregnant to notify the physician or technician before the examination.

## Using the NOMAD™ Cordless Handheld X-ray Unit (5/07)

Some clinics have been told that they can't use the NOMAD Cordless Handheld X-ray Unit (Aribex) for taking routine radiographs. For example, F.E. Warren AFB had an inspection of their radiology equipment by an AF Medical Physicist and was informed that the NOMAD should not be used for "routine" radiographs, but should only be used for emergency, forensic, veterinary, or deployment applications. The physicist also recommended that a [Technique Factor Chart](#) be prepared, laminated, and placed with the unit. These suggestions/restrictions may contradict the intended use in many clinics of supplementing radiology capability using NOMAD units as opposed to purchasing and installing fixed tube heads. A [policy letter](#) has been formulated by Air Staff level which provides additional guidance for the use of hand-held units.

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## Computer Monitor and CPU Configurations (1/07)

- The computer monitor will serve as the "view-box" for digital radiography. It should be located near the dental providers for easy accessibility (i.e., not on a counter/wall at the foot of the patient).

- Location at the 12 o'clock wall position is ideal (behind the head of patient). This location is accessible to both dentist and assistant.

- If unable to place on the 12 o'clock wall, the best second choice is the lateral wall, on the dentist's side, near the head (not foot) of the patient. If placing on the lateral wall, it is beneficial to have a second LAN drop on the opposite lateral wall to allow repositioning of the computer for a left-handed provider.

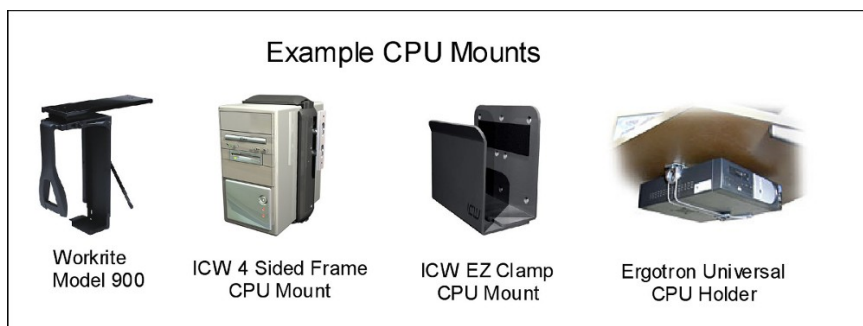
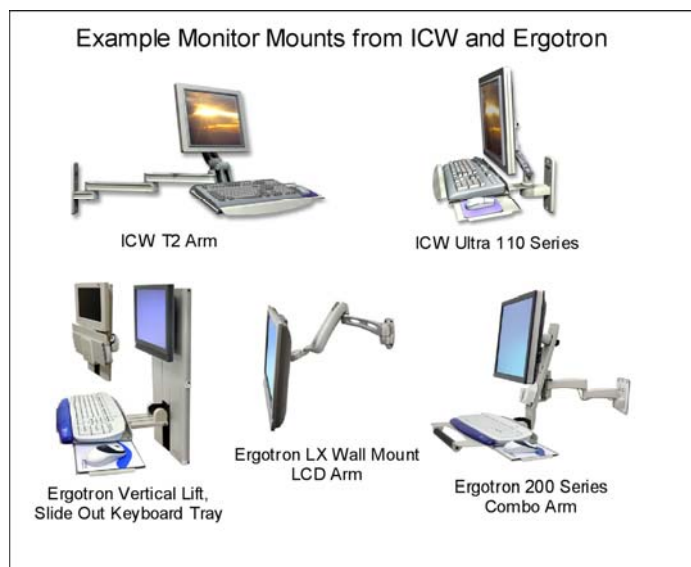
- The monitor/computer must be an acceptable distance away from any sink to avoid electrical safety concerns.

- Monitors can be placed on a countertop, but if counter space is not ideal or is required for other purposes, wall-mount brackets are available. Ergotron ([www.ergotron.com](http://www.ergotron.com)) and ICW ([www.icwdental.com](http://www.icwdental.com)) both offer several mounting systems.

- Mounting a monitor on an arm on the dental patient treatment unit/chair is typically done only when two monitors are placed in a treatment room. The chair-mounted monitor serves as a secondary monitor for patient education and radiographs. The primary monitor, located either behind or to the side of the patient as described above, is used for patient records, scheduling, and radiographs. Both monitors are connected to the same CPU, so the CPU must either have two video cards or a video card with dual monitor ports. Chair- and dental unit-mounted monitors also require a path to run a video cable from the computer to the floor box of the dental unit. Most clinics will probably not have a chair-mounted secondary monitor.

- The keyboard and mouse may sit on the countertop, under the counter on a pull-out tray, or on a wall mount.

- CPUs may be placed in a cabinet or be placed under the counter in a holder mounted either to the underside of the counter or to the wall. It's important to try to keep the computer off the floor to avoid damage from routine facility/floor cleaning procedures such as mopping.



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## Fixed-Mounted X-Ray Unit Considerations (1/07)

- Probably the best location for an intraoral x-ray unit in a DTR is on the "12 o'clock" wall behind the patient. If the DTR configuration will not allow this, an alternate location is one of the lateral walls or the ceiling.
- Pass-through cabinets may be used to share one x-ray unit between two treatment rooms. If pass-through cabinets are used, they should usually be purchased with a lead lining option because the wood/laminate cabinet doors do not provide the same degree of shielding as does gypsum wallboard. If you choose to use pass-through cabinets, consider the additional cost (approximately \$1,000 [govt] for the cabinet, not including installation costs).
- Some manufacturers offer a ceiling mount. Ceiling-mounted arms may interfere with treatment lights, and they cannot be folded out of the way as neatly as a wall-mounted unit when not in use. Elmendorf AFB recently encountered this problem with their ceiling-mounted treatment lights and newly installed x-ray units/arms. They also did not order or receive the appropriate ceiling plates/covers to seal the DTR ceiling after installation of the x-ray arm. These ceiling covers/plates are necessary to provide ideal DTR esthetics and to eliminate the infection-control concern of an open ceiling. Don't assume anything when planning equipment acquisitions and installation.
- Take into account the possible need for wall reinforcement. Units can usually be mounted on wooden studs, but most Air Force clinic construction uses metal studs. Metal studs typically require reinforcement or the wall can be sandwiched between two plates. Follow manufacturers' mounting guidance.
- Typical gypsum wallboard construction usually provides adequate shielding for most dental operator installations, but clinics must consult with Bioenvironmental Engineering before installing x-ray units to confirm that adequate shielding is present.
- Installation usually requires the addition of a dedicated electrical circuit.
- Manufacturers typically offer their units with multiple arm-reach options. Several clinics have recently ordered or received units with arms that are too short to work in the DTR. Measure the distance from the mounting location to the opposite side of the patient's head and order an x-ray unit with appropriate arm length/reach.
- Decide if you want to use a corded trigger switch or if you want to mount a control panel on an external wall, then order accordingly.
- Many newer units use very high frequency (i.e., DC) generators rather than AC generators. While not essential, the DC units may have some advantages with digital radiography.
- Most manufacturers offer a long-cone option. If a paralleling technique is to be used, consider ordering this option.

A-Dec X-Ray Storage Insert



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## USB Extension Cables/Mounts for Digital Sensors (1/07)

To eliminate sensor cord interference between the dental unit/chair and CPU connection, USB extension cables may need to be used. The extension cable can be used to avoid the need to run the sensor cable directly across the room between the patient and the computer. The extension cable can be attached to the x-ray unit's arm with Velcro straps or cable ties, running along the full length of the arm back to the wall. The sensor itself can be placed in a small holder attached to the x-ray unit head. Note that there is a 5-meter (16-ft) limit on the length of any USB cable. There are two options when extending a USB cable. You can purchase a booster device which allows transmission up to 45 meters (150 ft) over a cat5E cable, or you can connect up to five 5-meter active USB extension cables together (for a total of up to 25 meters [80 ft]). Before ordering any extension, check to see if your sensor uses USB 1.1 or 2 and order a compatible extension.

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Sensor Cable Routing

Planmeca Example



USB Extender from Cables To Go

